

NON-PUBLIC?: N  
ACCESSION #: 9303150055  
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Surry Power Station, Unit 1 PAGE: 1 OF 05

DOCKET NUMBER: 05000280

TITLE: Unit 1 Reactor Trip During Reactor Protection System  
(RPS) Surveillance Testing  
EVENT DATE: 02/09/93 LER #: 93-002-00 REPORT DATE: 03/08/93

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:  
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:  
NAME: M. R. Kansler, Station Manager TELEPHONE: (804) 357-3184

COMPONENT FAILURE DESCRIPTION:  
CAUSE: X SYSTEM: JC COMPONENT: RLY MANUFACTURER: X999  
REPORTABLE NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

At 1043 hours on February 9, 1993, with Unit 1 at 100% power and Unit 2 at 94% power, a Unit 1 reactor trip and turbine trip signal occurred when the "A" Reactor Trip Breaker unexpectedly opened. At the time of the trip, licensee technicians were completing regularly scheduled surveillance testing on the Unit 1 "B" Train Reactor Protection System. When a technician depressed the push button to open the "B" Reactor Trip Bypass Breaker to restore the breaker arrangement to its normal configuration, the "A" Reactor Trip Breaker opened. The cause of the reactor trip breaker opening was a failure of the shunt trip (ST) relay on the "A" Reactor Trip Breaker. Post-trip response was satisfactory. The reactor was placed in a safe, hot shutdown condition, and the health and safety of the public were not affected. The ST relay was replaced and the defective relay has been returned to the vendor for failure analysis. This report is required by 10 CFR 50.73(a)(2)(iv).

END OF ABSTRACT

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## 1.0 DESCRIPTION OF THE EVENT

On February 9, 1993, with Unit 1 at 100% power and Unit 2 at 94% power (in end-of-life power coast down), licensee technicians were conducting regularly scheduled surveillance testing on the Unit 1 "B" Train Reactor Protection System (RPS) (EIIS-JC). Testing on the "A" Train had been satisfactorily completed, and the "A" Bypass Breaker had been opened at 1012 hours. At 1043 hours, with "B" Train testing satisfactorily concluded, a technician was in the process of returning the Reactor Trip Breaker (RTB) (EIIS-AA-72) alignment to its normal operating condition by opening the "B" RTB Bypass Breaker. In accordance with normal operating practices, a Licensed Senior Reactor Operator had verified that the "B" RTB was racked in and closed prior to initiating action to trip the bypass breaker. When the technician depressed the push button to trip the "B" Bypass Breaker, RTB "A" unexpectedly opened nearly simultaneously, initiating a reactor trip and a turbine trip signal. All control rods inserted to the bottom of the core as designed and automatic actuations occurred as expected. Post-trip response was satisfactory except for the following:

- o A more rapid than expected Reactor Coolant System (RCS) (EIIS-AB) cool down occurred following the trip. RCS temperature decreased to approximately 522 degrees F and RCS pressure decreased to approximately 1780 psig, resulting in pressurizer (EIIS-AB-PZR) level decreasing to offscale, low. The Main Steam Trip Valves (MSTV) (EIIS-SB-ISV) (1-MSTV-101 A, B, and C)) were shut three minutes into the event to halt the cool down. The following conditions contributed to the cool down:

- Moisture Separator and Reheater (MSR) reheat steam supply flow control valve (EIIS-SB-FCV) (1-MS-FCV-104D) did not fully shut.

- High Pressure Turbine main steam stop valve bypass valves (EIIS-SB-PCV) (1-MS-PCV-111/114) stuck in the open positions.

- The turbine-driven and both motor-driven Auxiliary Feedwater (AFW) Pumps (EIIS-BA-P) (1-FW-P-2, 3A, and 3B) started as designed upon receipt of low-low steam generator levels. The resultant addition of lower temperature feed water to the steam generators contributed to the total cool down

rate.

- Steam is supplied to the turbine-driven AFW Pump from the main steam system. This steam load was another contributor to cool down of the RCS.

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- o During the decreasing pressure/temperature transient, pressurizer heater banks (EIIS-AB-EHTR) received an automatic trip signal because of low pressurizer level. "B" Heater Bank did not trip automatically and was tripped locally.

- o Intermediate Range Nuclear Instrument (IRNI) (EIIS-IG-JI) Channel II (NI-36) indication was observed to go off-scale low during the shutdown because of a problem with instrument compensation. However, the Source Range Nuclear instruments (SRNI) (EIIS-IG-JI) automatically reinstated as designed.

- o Subsequent to the initial plant transient, as RCS pressure began to recover rapidly, the Licensed Control Room Operator elected to take manual control of pressure in anticipation of a possible controller saturation condition. Because of a sticking push button in the controller, Pressurizer Power Operated Relief Valve (1-RC-PCV-1455C) (PORV) (EIIS-AB-RV) opened for approximately five seconds before reseating properly.

This report is required by 10 CFR 50.73 (a)(2)(iv) because an automatic actuation of the reactor protection system occurred.

## 2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

Upon receipt of the reactor trip, station operating personnel acted promptly to place the plant in a stable, hot shutdown condition. The off-normal operational events described in the preceding paragraph were dealt with properly and expeditiously. Operator action in shutting the Main Steam Trip Valves arrested the post-trip cool down transient. The shutdown margin of reactivity was calculated and found to be satisfactory. The health and safety of the public were not affected.

## 3.0 CAUSE OF THE EVENT

Post-trip investigation of the reactor trip breakers and bypass breakers revealed a failure of the Shunt Trip (ST) Relay on the "A" Reactor Trip Breaker. An open coil was discovered which apparently

had failed at the approximate time the trip push button for the "B" Bypass Breaker was depressed. When this normally energized relay opened, a trip signal was generated which tripped the breaker.

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#### 4.0 IMMEDIATE CORRECTIVE ACTION(S)

Operators acted promptly to place the plant in a safe, hot shutdown condition. The Shift Technical Advisor monitored the safety function status trees to verify that unit conditions were acceptable.

#### 5.0 ADDITIONAL CORRECTIVE ACTION

##### o Reactor Trip Breakers

- The defective "A" Reactor Trip Breaker shunt trip relay was replaced. The "B" Reactor Trip Breaker shunt trip relay was also replaced as a precautionary measure. In order to assure operability of the breakers after relay replacement, appropriate portions of the applicable surveillance testing were performed prior to Unit 1 restart.

- The shunt trip relays on the Unit 2 "A" and "B" Reactor Trip Breakers will be replaced during the current refueling outage.

##### o Because of the off-normal post-trip events described in Section 1.0 above, the following corrective actions were taken prior to Unit 1 restart:

- RCS Cool Down. An engineering evaluation conducted into the cause of the overcooling concluded that the major contributor to the cool down was the MSR reheat steam supply flow control valve (1-MS-FCV-104D). The valve's built-in jacking mechanism was found to be partially engaged, allowing the valve to fully stroke to the open position, but preventing it from shutting completely. The jacking mechanism was adjusted properly, allowing full freedom of movement in both directions. The out-of-position turbine main steam stop valve bypass valves, the injection of colder auxiliary feedwater into the steam generators, and main steam drawn by the turbine-driven auxiliary feedwater pump contributed to the cool down rate, but were not considered to be major factors.

- Pressurizer Heaters. The "B" Bank of pressurizer heaters was found to have a defective circuit breaker which was repaired satisfactorily prior to restart.

- Intermediate Range Nuclear Instrument Channel II (NI-36). Surveillance testing was performed satisfactorily on NI-36 prior to restart.

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- Lifting of Power Operated Relief Valve (PORV) 1-RC-PV-1455C. The cause of the valve lift was found to be a sticking push button in the Pressurizer Master Pressure Controller. The push button was cleaned and freed up to correct this condition prior to restart.

## 6.0 ACTIONS TO PREVENT RECURRENCE

The relay which was found to be defective has been returned to the vendor for failure analysis. Further corrective actions will depend on the results of that analysis. Further actions may be instituted upon receipt of the vendor's analysis of the shunt trip relay failure.

As reported in Licensee Event Report 50-280/93-001-00, "Reactor Trip and Safety injection Due to Spurious High Consequence Limiting Safeguards Signal Caused by Malfunctioning Relay", an Engineering Evaluation is being performed to identify single point failures which can cause spurious actuations. The feasibility of modifying circuitry to remove single point failures will be evaluated.

## 7.0 SIMILAR EVENTS

None.

## 8.0 ADDITIONAL INFORMATION

Potter and Brumfield Model MDR 5076-1 rotary relay.

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10CFR50.73

Virginia Electric and Power Company  
Surry Power Station  
P. O. Box 315

Surry, Virginia 23883

March 8, 1993

U. S. Nuclear Regulatory Commission Serial No.: 93-118

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Washington, D. C. 20555 Docket No.: 50-280

License No.: DPR-32

Dear Sirs:

Pursuant to Surry Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to Surry Power Station Unit 1.

REPORT NUMBER

50-280/93-002-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

M. R. Kansler  
Station Manager

Enclosure

cc: Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

M. W. Branch  
NRC Senior Resident Inspector  
Surry Power Station

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